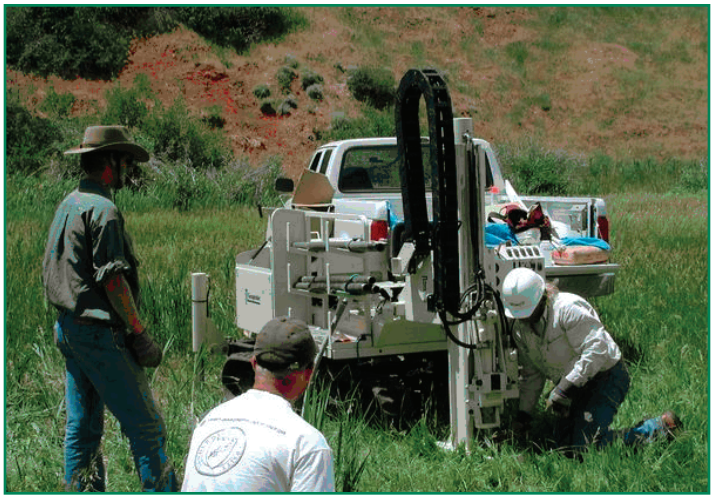
Cooperator Note

NAGT-USGS Cooperative Summer Field Training Program

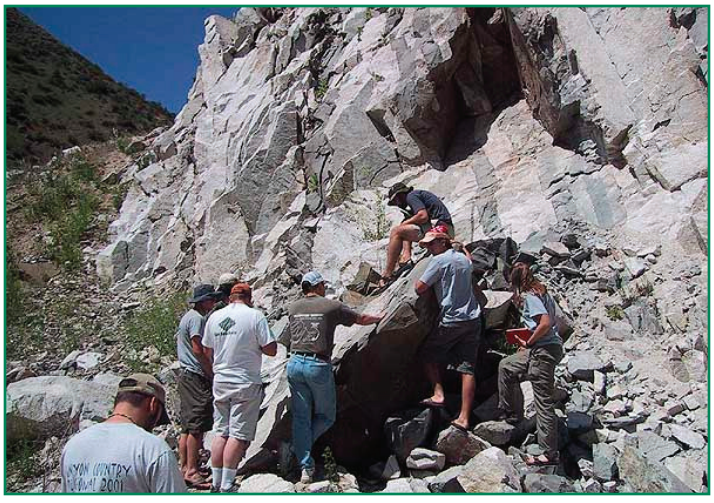


Now beginning its fifth decade, the NAGT-USGS Cooperative Summer Field Training Program is the longest, continuously-running internship program in the earth sciences. Over the past forty years, over 1500 students have participated in this program with an impressive number of these individuals becoming full-time employees of the USGS.

The Coop Program was launched at the Geological Society of America meeting in Kansas City in early fall of 1965 when William "Bill" Pecora, then the newly appointed Director of the US Geological Survey, held a meeting with a small group of distinguished professors and officers of the National Association of Geology Teachers. Pecora felt strongly that the Survey needed to be more engaged in geological education. He had a plan for how this might be accomplished and wanted to get the professors' reactions to an initiative that would provide better linkage to academia while, in the process, providing better summer field assistants for the Bureau. The plan was one whereby The Survey would provide support for outstanding undergraduate geoscience majors, while NAGT would advertise the program to faculty and students; solicit nominations; distribute applications, and; assist in processing all materials. Needless to say, "Pecora's Plan" (as it became known) met with instant approval.

Although some modifications have been made over the years, the NAGT-USGS Cooperative Summer Field Training Program operates today much as it did from the beginning. With active participation from the highest levels of both organizations (including the Director of the USGS), a joint committee oversees the program. The program "year" begins in September with all field camp directors being provided information about the program and the opportunity to nominate up to three students (based upon total camp enrollment). Nominated students send their applications to the Environmental Careers Organization (ECO), the managing partner of the program, along with an accompanying letter of interest and transcripts. USGS scientists interested in working with an intern also send information about field, laboratory, or office related scientific projects to ECO. Candidates are linked with up to five projects that match their skills and interests, with project needs. The listing of candidates and accompany academic information is sent to USGS personnel for review, interviews, selection, or possible further discussion. USGS personnel make final selections. As interdisciplinary, system science is a cornerstone of our science, all disciplines are encouraged, and do take advantage of, this program's support and available talent. Students hired through this program have continually received outstanding reviews from our managers and, over the decades, an impressive number of these individuals have become full-time colleagues. Interns employed through this program are hired at a rate comparable to the GS-5 Grade, Step 1, level with an adjusted locality payment.

Over the years, NAGT has succeeded in identifying top-flight students for the program, and the Survey has succeeded in garnering the interest of competent and enthusiastic supervising mentors. Evaluations of the program by the students have been strongly positive, and the interns have continually received outstanding reviews from our managers. From the vignettes of this year's interns below, it would appear that the NAGT-USGS Cooperative Summer Field Training Program continues Pecora's vision of greater educational involvement, and continues to provide superior summer assistants to the U.S. Geological Survey and a first-rate professional experience to students early in their careers.



What I Did This Summer – 2006 NAGT/USGS Cooperative Summer Field Training Program Interns Tell Their Science Stories

NAGT Intern: Aaron Powers
College: University of California, Santa Cruz
Advisor: Robert Rosenbauer
Location: Menlo Park, CA
Project: Eelgrass Habitat Assessment of Puget Sound

A 2006 earth sciences graduate of the University of California at Santa Cruz, Aaron Powers was nominated for the NAGT/USGS Cooperative Summer Field Training Program by Hilde Swartz, his previous summer field instructor. Asked about his interest in being a part of the NAGT program, Aaron said, "I'm a conservationist at heart and I was looking to bring my primary interests in structural geology, paleontology, geomorphology, and ground-water systems to bear on maintaining all aspects of a healthy ecosystem." Aaron worked with Bob Rosenbauer at the USGS in Menlo Park, CA, on a project that deals with the rapid disappearance of eelgrass in the Puget Sound over the last few decades and determining whether the recent loss is part of a natural cycle or the result of anthropogenic activities. As Aaron described it, "Eelgrass is a critical environment for juvenile salmon to grow in size and become acclimated to salt water. The chance for their survival in the open ocean depends in great measure on this time spent sheltered in eelgrass beds. Higher in the food chain, Orcas depend on the salmon, consuming about 300 pounds every day to survive. What begins, then, with the simple loss of eelgrass can have consequences that affect the entire ecosystem of the Puget Sound. I see this project as being critically important in ensuring that the beautiful, diverse ecosystem of the Puget Sound continues to thrive."

Aaron worked primarily in a lab setting, using 210Pb dated sediment cores to establish a chronology. Taking sediment samples from different geographic locations and sediment depths, he used organic solvents to isolate different compounds in the sediment samples. Industry, agriculture, and urban runoff are sources for the compounds in the sediment. Once the compounds were isolated, the samples were run through a gas chromatograph/mass spectrometer, which identifies and quantifies the compounds within each sample. They have found that biomarkers for some of the compounds can be used to identify the paleo-occurrence of eelgrass throughout Puget Sound. These data provide an understanding of the composition of eelgrass and associated sediment and how they have changed over time. Aaron was able to see how interpretation of the data will show what steps can be taken to mitigate the decline of eelgrass in Puget Sound. He summarized his internship by saying, "I've found my experience at the USGS to be educational and rewarding and I'm proud to have been part of this project."

NAGT Intern: Amy Dawson
College: West Virginia University
Advisor: Rob Striegl
Location: Boulder, CO
Project: Yukon River Drainage Basin Sample Analysis

Growing up on a small cattle farm in north-central West Virginia, Amy Dawson learned early on to respect the land and its inhabitants. Over time, she found herself increasingly aware of environmental degradation, as she called it, in and around her community. She cited, in particular, an instance of ground-water contamination in a nearby community from coal mining practices. As a result of this, she said, "I began to focus interest on environmental remediation and rectification efforts. Majoring in geology at West Virginia University gave me the opportunity to learn about the Earth's processes, including coal-related contamination and ground and surface water issues. Following on my recent graduation, the NAGT/USGS Cooperative Summer Field Training Program has enabled me to keep learning about water testing and pollutants, while broadening my interest in other environmental issues such as global warming and the migration of air pollution."

Amy worked with USGS hydrologist Rob Striegl in Denver, CO, on water samples from the Yukon River drainage base in Alaska and Canada. "I used GIS technology to spatially locate where the water samples were taken," Amy said. "The project was fascinating and I'm looking forward to pursuing a career in environmental geology."

NAGT Intern: Brittany Guzzo
College: University of Illinois, Urbana-Champaign
Advisor: Edward Landa
Location: Reston, VA
Project: Tire-Ware Analysis

Born and raised in the Chicago area, Brittany Guzzo received her bachelor's degree in geology from the University of Illinois at Urbana-Champaign. "As a child, I was fascinated with geology and understanding the Earth and its origins, an interest which grew as I became more aware of the environmental issues facing my generation," she said. "I realized that geology can play a role in addressing these issues, especially within an interdisciplinary context with other natural and social sciences."

Brittany felt honored to be nominated for the NAGT/USGS Cooperative Summer Field Training Program, which has given her a chance to put her interests into practice. She worked with Edward Landa at the USGS in Reston, VA, investigating how tire particles break down in the environment. The project focused on the Washington, DC, metropolitan area. "The research I was involved in will contribute to understanding how contaminants from decaying tires enter and affect soils and ground water," Brittany said. She cited the opportunity to work with seasoned USGS scientists as one of the benefits of her NAGT internship, which allowed her to gain practical experience in geochemistry and geomicrobiology. She sees these fields as being of growing importance in understanding the complex role that geology plays in managing natural resources. "I'm confident the skills and

knowledge I acquired this summer will serve me well throughout my career," she said.

NAGT Intern: **Curtis Barnes**
College: **San Francisco State University**
Advisor: **John Nimmo**
Location: **Menlo Park, CA**
Project: **Unsaturated-Zone Flow Project**

For his internship in the NAGT/USGS Cooperative Summer Field Training Program, Curtis Barnes worked with John Nimmo, a veteran of two other NAGT internships, on an unsaturated-zone flow project, at the USGS in Menlo Park, CA. The project's main goal is to measure, predict, and understand the flow of water through soil and rock between the land surface and the water table. As Curtis explains it, "By measuring a soil's hydraulic properties, you can determine how easily water travels through the soil, which has applications for studying ground-water recharge and contaminant transport and remediation." His specific task focused on the soil water retention curve and because this is difficult to measure, he says, "I worked to improve existing property transfer models that predict soil water retention from more easily measured properties. He noted a major benefit of the internship was being exposed to laboratory techniques and computer programs with which he had had no previous experience, such as using MATLAB for data analysis. "Also, I'm measuring water content and energy state on a few dozen soil samples," Curtis said of the new skills he's acquired. "I found the internship to be a wonderful complement to the extensive field work and strong emphasis on oral and written scientific communication that were part of my undergraduate training at San Francisco State University."

Curtis hopes to attend graduate school to study general surface processes and fluvial geomorphology, in particular. "I am interested in the impact of base-level change on channel and drainage network evolution. Until I decide on graduate school, the internship has given me the experience necessary to help launch me professionally as a hydrogeologic consultant," he said.

NAGT Intern: **Danielle Odette**
College: **Western Michigan University**
Advisor: **Jonathan Caine**
Location: **Lakewood, Colorado**
Project: **Central Colorado Assessment Project**

Danielle Odette was nominated for the NAGT/USGS Cooperative Summer Field Training Program after completing the University of Michigan's Geologic Field Mapping course in Wyoming during the summer of 2005. She recently graduated from Western Michigan University with dual bachelor's degrees in geology and in geography/natural resources management, which, she feels, prepared her with the right academic credentials for her USGS internship. "I have always had an interest in science," she said. "After my first geology course, I was hooked. My undergraduate studies provided abundant field experience across the United States and strong computer skills, which have strengthened my abilities as a young field scientist." When she heard about her nomination for the internship, she was truly excited about the prospect of spending the summer immersed in the type of work that she loves and, she says, "I was not disappointed!"

For her internship, Danielle worked with Jon Caine and a team of USGS scientists on a structural analysis of the Front Range, as part of the USGS Central Colorado Assessment Project. "We were doing field and laboratory-based characterization of geologic structures throughout the Front Range, and how these structures may have controlled mineralization, hydrothermal alteration, and fluid flow, " she said. "Half of my time was spent at rock outcrops along the Front Range as a field assistant. I am very fortunate to have an "office" in such a beautiful part of the world." Danielle spent the other half of her time at the Denver Federal Center, digitizing a number of Colorado quadrangle maps using a variety of GIS software. She's proud to note that "A paper on our work will be ready for publication at the end of the project."

Danielle found the internship to be a wonderful opportunity that allowed her to work with professional research scientists in the creative process of field-based characterization of geologic structures in highly complex geologic settings. Other benefits she cited were, "I have also been able to enhance my skills as a geologist, with field work, geologic data compilation, data mining, and use of GPS and GIS." She notes that she will be attending graduate school in the fall and that her internship experience will provide a solid foundation on which to being her graduate studies. "I plan to continue doing field geology," she said, "and look forward to a career as a geoscientist."

NAGT Intern: **Erica Simmons**
College: **Stanford University**
Advisor: **Dan Dzurisin**
Location: **Vancouver, WA**
Project: **Monitoring of Mount Saint Helens**

Erica Simmons, a June 2006 graduate of Stanford University with a double major in archaeology and geological and environmental sciences, decided that geology was for her when she arrived at Stanford and found her new landscape surroundings so different from where she had grown up in Maine that she wanted to learn and understand more. "I took an introductory course on California geology," she said, "but the experience that really made me fall in love with the subject was a field trip to Death Valley, Long Valley Caldera, and the Mono-Inyo Craters with Gail Mahood, my volcanology professor." At Stanford, Erica studied a wide range of courses in the geosciences, from hydrology and soil science to volcanology, petrology, and geochemistry. For her field requirement, she attended the famous proving ground in field geology that Indiana University operates in southwestern Montana. She learned general mapping techniques and quite a bit of structural geology, as well as how to analyze surface hydrology. Of this experience she said, "I really enjoyed mapping and getting to explore Montana. It was from my participation in this program that I was nominated for the NAGT/USGS Cooperative Summer Field Training Program internship."

For her internship, Erica worked with Dan Dzurisin at the USGS Cascades Volcano Observatory (CVO) in Vancouver, WA, on a project doing photogrammetric monitoring of Mount St. Helens. She described it this way: "So far, this has involved

working with photos taken of the current eruption since its beginning in October 2004, making time-lapsed videos, and helping to design a new camera for placement inside the volcano's crater. I love photography, so this project gives me the opportunity to incorporate my hobby with my geologic skills to study volcanoes." She noted that she also had an opportunity to work on field projects at Oregon's Three Sisters and a nostalgic trip back to Long Valley Caldera. Erica hopes to work in geology or cultural resource management while she considers continuing on to graduate school. She summed up her experience as "a great opportunity for me to get a glimpse of the USGS while working in a very unique setting—a volcano observatory. This was an exciting place to be an intern!"

NAGT Intern: **Erik Gulbranson**
College: **University of Minnesota, Duluth**
Advisor: **Melinda Chapman**
Location: **Raleigh, NC**
Project: **Ground-water Assessment of Piedmont and Mont Region**

Erik Gulbranson was nominated for his internship in the NAGT/USGS Cooperative Summer Field Training Program by the director of the field camp in the Wasatch-Uinta area that he attended while doing his undergraduate work at the University of Minnesota-Duluth. He enthused that it was terrific "to have such an opportunity to work with the USGS, since I believe the USGS provides a way to enhance one's professional development through both public stewardship and working with scientifically interesting problems."

For his internship, Erik worked with Melina Chapman and the USGS office in Raleigh, NC, on ground-water studies of fractured crystalline-bedrock aquifers. His primary interests, however, are in paleoclimatology, isotope geochemistry, and sedimentology and stratigraphy. He was glad to have the opportunity to work in a number of different disciplines within geology as he feels that's one of the strengths of the geosciences. He said, "The scientists I worked with at the USGS introduced me to new subjects and disciplines in such a way that broadens my geologic intuition and understanding of 'real-time' and 'real world' issues." Such experience, in his estimation, is invaluable, particularly for recently graduated geologists.

Erik will be going on to attend the University of California-Davis, pursuing his doctorate in paleoclimatology. His bottom-line reflection on the internship experience: he'd like to continue working with the USGS.

NAGT Intern: **Ian Orland**
College: **Washington University in St. Louis, MO**
Advisor: **Connie Loper**
Location: **New Cumberland, PA**
Project: **Ground-water Pesticides Network Project**

The field of geology first captured the imagination of Ian Orland when he was a college freshman at Washington University in St. Louis. Not only was he captivated by the subject matter of a class entitled, "Human Use of The Earth," he found that it also challenged his perceptions about the world around him. He said, "I was soon fully committed to majoring in the earth and planetary sciences and found myself working in two labs in the geology department. As an upperclassman, he developed more specific interests in hydrogeology, geochemistry, and surface and subsurface geomorphology. His instructors inspired his personal interest in field methods and mapping. As he said, "Many classes stressed that the best way to study a geologic feature is to immerse oneself in it, sometimes literally. My field camp experience with the University of Missouri in the summer of 2005, which was on an NAGT scholarship, was the perfect outlet for my interest in fieldwork."

Following the field camp, he was invited to apply for the NAGT/USGS Cooperative Summer Field Training Program. He had a number of reasons for being thrilled with this opportunity: 1) he got to work with the USGS, 2) use his college degree, and 3) get his boots dirty in the field. He worked with the USGS office in New Cumberland, PA, on the Ground-water Pesticides Network Project, which is co-sponsored by the Pennsylvania Department of Agriculture. He said of his work, "I am currently in the process of sampling approximately 30 ground-water wells in a specific geologic setting across Pennsylvania to gain an understanding of the influence of agricultural activity on ground-water quality.

He talked about the benefits of the internship as exposing him to the people and projects of the USGS and preparing him the next step in his geology education. "I'm learning about all the elements—lab, field, and office—that are critical to successfully running a large research project," he said. He is headed to the University of Wisconsin-Madison next to begin graduate studies in their Geology and Geophysics Department. "I have a special interest in the field of geochemistry," Ian said, "specifically concerning stable isotopes. My internship experience will undoubtedly contribute to my success as a grad student and beyond."

NAGT Intern: **Jasper Oshun**
College: **Brown University**
Advisor: **John Jones**
Location: **Reston, VA**
Project: **Mid-Atlantic Landscape Processes Research**

Jasper Oshun had his own eureka experience to recount about how he discovered geology. Towards the end of his second year at Brown University, he said, he felt dissatisfied with his studies in international relations and saw his lack of travel further afield than vacations in Mexico to be a constraint in better understanding international politics and fellow students from other lands. He decided to spend a semester volunteering in the Peruvian Andes, just outside Cuzco. "Here," he said, "I developed a soulful attachment to the immense mountains that surrounded where I was living. When I returned to Brown for the spring semester, I had a new-found interest in studying the physical world and I mapped out a concentration in geology."

Realizing that research is becoming increasingly dependent on computer-based analyses, Jasper assisted in processing remotely sensed data – extremely marketable and powerful skills – through an independent research project for his final semester at Brown in the fall of 2005. Armed with those new skills, he looked for work opportunities in which to apply them and happened on an exciting research project aimed at linking destruc-

tion patterns between the physical and social spheres as a result of Hurricane Katrina. He had a chance to use his remote sensing analytical tools and was involved in the grant writing process and brainstorming sessions with a team that included a geologist, an environmental scientist, and a number of sociologists, as well as a public health specialist.

His field camp experience was through Idaho State University at the foot of the Lost River Range in the summer of 2005 where he learned to accurately assess and interpret geologic formations. He said, "I found that I had a particular knack for keeping four dimensional images floating in my head until the crucial piece of evidence was uncovered to solve the puzzle." A nomination from the camp's director, Paul Link, gave Jasper his shot at the NAGT/USGS Cooperative Summer Field Training Program internship. He interned with USGS research geographer John Jones in Reston, VA. He analyzed satellite imagery and field-collected meteorological data to assess whether changes in climate could be detected in the remotely sensed record of vegetation in Shenandoah National Park. "Because many factors contribute to inter-seasonal variability in phenology," he said, "we had to separate various effects to define the impact of climate on phenological variation over the last 20 plus years. The data from the project will be related to other landscape processes in the Shenandoah National Park and Potomac River headwaters as part of the USGS Landscape Dynamics and Environmental Processes Project.

NAGT Intern: **Joanna Troy**
College: **Tufts University**
Advisor: **Denis LeBlanc**
Location: **Northborough, MA**
Project: **Massachusetts Military Reservation Groundwater Analysis**

Joanna Troy caught the rock collecting bug early, hording bags and bags of anything that was shiny. Ever since then, she said, she has been fascinated by the natural world. "I went to college with the expressed intention of studying geology," she said. "The atmosphere in the geology department at Tufts University was such that I soon knew for sure that this is where I wanted to be." She is a veteran of the Montana field camp run by the University of Indiana, of which she said, "Never have I ever worked so hard and had more fun." She was honored to be nominated for and given an internship with the NAGT/USGS Cooperative Summer Field Training Program.

Her internship was with the USGS in Northborough, MA, working on Cape Cod with Denis LeBlanc. It was kind of like coming home for Joanna, as the previous summer she and a fellow Tufts graduate had the opportunity to work with the USGS on the Cape, which she praised highly. Most of the work she was involved in was centered on research into the long-term natural response of ground water to the cessation of treated sewage discharge. "It was exciting to be involved with such timely and important research," she said. "The internship gave me the opportunity to see geologic research in practice, instead of just studying it in school. Next year, I'll continue my geology studies at Lehigh University, feeling even more confident that I can conduct current and pertinent research."

NAGT Intern: **John Stolz**
College: **University of Wisconsin-Eau Claire**
Advisor: **Gerald Butch**
Location: **Troy, New York**
Project: **Surface-water Network Management**

A former professor nominated John Stolz for his internship with the NAGT/USGS Cooperative Summer Field Training Program. He worked with Gerald Butch in the USGS office in Troy, NY.

He was involved in a variety of tasks and although much of his summer work consisted of maintaining and repairing gages, he also had opportunities to get out in the field and conduct data collection for ground- and surface-water activities. "After only one day in the program," he said as an example, "I was already in the field learning to take measurements and collect data from local ground-water wells." He also assisted in making stream discharge measurements using advanced Acoustic Doppler Current Profiler sensors.

He summed up his internship with these comments: "The people here are great. The hydrologic surveillance and investigations section in the Troy office was really helpful in teaching me data collection techniques and giving me hands-on experience. This was a wonderful opportunity and I look forward to using what I have learned in the future."

NAGT Intern: **Kristian Bergen**
College: **Harvard University**
Advisor: **Walter Mooney**
Location: **Menlo Park, CA**
Project: **Napa Valley and Indian Ocean Assessment Project**

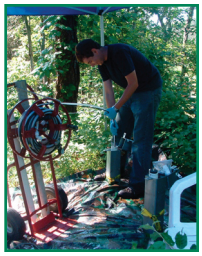
For Kristian Bergen, it was growing up in the Snake River Valley of southeastern Washington State and then moving north with his family to Coeur d'Alene, ID, that nurtured his interest in the earth sciences. A graduate of Harvard in earth and planetary sciences, with an emphasis in structural geology, he had the opportunity to work extensively with the multi-partner Southern California Earthquake Center and its community fault model, including three-dimensional modeling of faults based on seismic reflection, focal mechanism, aftershock, and surface data.

His internship with the NAGT/USGS Cooperative Summer Field Training Program resulted from attending a geology field camp in the San Juan region of Argentina with Suzanne Mahlburg Kay, a professor at Cornell University. He was intrigued by the opportunity that the internship would give him to work with the USGS Earthquake Hazards program. "I became interested in studying seismic hazards after working with constraining fault locations, geometries, and slip rates from a structural geology standpoint," he said, "and I was eager to continue work in this area."

The internship enabled him to broaden his horizons in hazards work. "I was able to learn new techniques for constraining the potential effects of earthquakes by helping model the structure of the sedimentary basin in the Napa Valley from earthquakes recorded by the seismic recording network there," he said. "I also had the opportunity to help work with improving seismic monitoring in the heavily populated Indian Ocean region by help-

ing train workers there to install and maintain seismic stations." Kristian reflected on his internship as being especially valuable in choosing his focus for graduate study in the coming years. "The internship at the USGS was a tremendous opportunity for me and I'm grateful for the opportunity to continue my education through this program."

NAGT Intern: **Luke Parsons**
College: **Brown University**
Advisor: **Denis LeBlanc**
Location: **Northborough, MA**
Project: **Massachusetts Military Reservation Ground-water Analysis**



For Luke Parsons, it was his outdoor-oriented family life in northern Arizona and his first rock collection that got him interested in geology, which was furthered by a move to Albuquerque, NM, and a geology course as a high school freshman. He continued to pursue these interests at Brown University with a major in the geological sciences. He attended the 5-week geology field course, sponsored by Albion College, in the mountains of Wyoming, Montana, and the Black Hills of South Dakota, which only added to his enthusiasm for geology. "Although geology is my first passion," he said, "I am also interested in global warming and climate change, issues related to pollution, and having an opportunity to teach." His learning in the geological sciences has enabled him to place that knowledge in the broader context of these other environmental issues. His senior honors thesis focused on research on Holocene climate change as recorded in geochemical proxies.

Luke was nominated for the NAGT/USGS Cooperative Summer Field Training Program by his field school supervisor. He worked with Denis LeBlanc from the USGS office in Northborough, MA, on a ground-water analysis project at the Cape Cod Military Reservation. "Because of my interests in the outdoors and the environment," he said, "the internship on the Cape Cod Military Reservation has been perfect for me. Luke and his NAGT colleague, Joanna Troy, worked outside daily sampling and testing ground water to determine the long-term effects—on a human and not a geologic scale, he notes—of sewage discharged into the ground in the mid to late 20th century. He summed up his experience with the USGS and said, "The hydrologists with whom we worked were patient teachers who not only showed us how to do the work but also explained why it's important. I can't think of a better way to have spent my summer!"

NAGT Intern: **Megan McKinney**
College: **Bloomsburg University of Pennsylvania**
Advisor: **Scott Sibley**
Location: **Reston, VA**
Project: **Minerals Yearbook and Mineral Commodity Summaries**

Megan McKinney was nominated for an internship with the NAGT/USGS Cooperative Summer Field Training Program by Gregory Baker, the supervising professor of the required field camp she attended, run by the State University of New York-Buffalo, while a geology student at Bloomsburg University of Pennsylvania. "Naturally," she said, "I was very excited and proud to be nominated for such a fantastic opportunity. After all the paperwork, resumes, and phone interviews, I was chosen to work with the USGS Minerals Information Team in Reston, VA.

She gives her experience with the USGS high marks. She worked with the Minerals Information Team researching and compiling data on gold production and reserves in the United States and around the world for use in the Minerals Yearbook and the Mineral Commodity Summaries (MCS), which are published each year by the USGS. "I was happy," she said, "to be part of helping the team to complete and produce the most up-to-date and accurate publications." While her studies in geology and the earth sciences had familiarized her with the study of mineralogy, she was unaware of the practical applications of that field of study. "Here at the USGS, I have been exposed to a whole new aspect of the world of geology," she said. "I hadn't studied economics in school, but being here has helped me understand that discipline better, as far as metal commodities are concerned, and I have a new understanding of the mining industry, which I really hadn't thought much about before." For her, the internship has been a real transition from college to the rest of the world. "Working in a professional environment such as this has helped me to gain more knowledge about not only the working world, but also to get a better sense of what I'd like to do in the future."

NAGT Intern: **Michael Bolz**
College: **Oklahoma State University**
Advisor: **Alena Leeds**
Location: **Albuquerque, NM**
Project: **Advanced National Seismic System Station Deployment and Maintenance Program**

A graduate of Oklahoma State University with a degree in geology, Michael Bolz' interests are mainly in the environmental aspects of geology. His internship with the NAGT/USGS Cooperative Summer Field Training Program, however, opened his eyes to the possibilities available in the geophysical areas. He spent the summer working with Alena Leeds at the USGS in Albuquerque, NM, on the Advanced National Seismic System Station Deployment and Maintenance Project. One thing that really sparked his interest was learning that he would be traveling all over the country. "Having lived in Oklahoma all of my life and never traveling very much," he said, "I haven't been able to experience a lot of the amazing geology throughout the country." He traveled through Texas, New Mexico, Colorado, Utah, Idaho, Oregon and Washington, all of which gave him a chance to see for himself what he had only seen in textbooks.

He worked with project scientists to set up seismic stations that are part of building an up-to-date model of the tectonic activity of the North American continent. The project is part of the backbone array of EarthScope, funded by the National Science Foundation and conducted in partnership with the USGS and NASA. Their work also has application for other earthquake research and for tsunami monitoring and response. "I was able to help to complete construction of two sites," he said, "and I'm excited to see where else this internship will take me."

NAGT Intern: **Michael Weston Busby**
College: **University of California, Sanata Barbara**
Advisor: **Alena Leads**
Location: **Albuquerque, NM**
Project: **Advanced National Seismic System**

A graduate of the University of California-Santa Barbara with a bachelor's degree in the geosciences, Michael Busby was nominated for the NAGT/USGS Cooperative Summer Field Training Program by the professor of the field course he had taken the previous summer. Michael had heard great things about the NAGT program and eagerly applied and felt honored to be nominated and selected.

For his internship, Michael worked with Alena Leeds at the USGS Albuquerque Seismological Laboratory on a project that is part of the Advanced National Seismic System. He helped to install and upgrade permanent seismic stations all over the United States. "The summer has been awesome," he said. Michael and a USGS field engineer drove from New Mexico to Neilton, WA, where they installed a new seismic station in the Olympia National Forest. They returned to Albuquerque for more equipment and then headed to Mineral Point, WI, to upgrade an old station. "Along the way, we did maintenance on stations in Iowa, Kansas, and Colorado," he said. "And then it was off to Alaska to help install two more seismic stations."

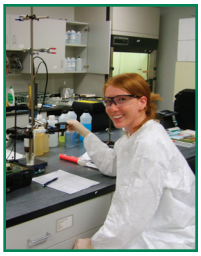
He learned about what it takes to acquire seismic data and expand a seismic network. "The installation of the seismic vaults, the seismometers, and the supporting equipment takes quite a bit of time," he said, "along with a lot of logistics and a great deal of precision. Between trips he prepared equipment and interacted with the USGS geologists to see how they interpret the seismic data and how they quality assure their data. "I found it really interesting and learned a lot about how much planning, work, and quality control it takes to set up and maintain a seismic network and the data," he said. "I'm extremely grateful for the opportunity to participate in the program and learn from true professionals."

NAGT Intern: **Ryan Davis**
College: **Auburn University**
Advisor: **Alena Leads**
Location: **Albuquerque, NM**
Project: **Advanced National Seismic System**

An entering graduate student at Auburn University, Ryan Davis was nominated for the NAGT/USGS Cooperative Summer Field Training Program following his summer field camp experience. He felt honored, given the competitive nature of the program, to have an internship and was excited to be working for the USGS Albuquerque Seismological Laboratory and its connection to EarthScope. For Ryan, the travel that came along with the job was a great bonus.

His internship started close to home for him in central Georgia with the installation of two borehole seismometers. From there, the team headed up the eastern seaboard for installations in North Carolina and Maine, allowing Ryan to see the major cities of Philadelphia, Baltimore, New York, Boston, and Providence for the first time. "The work itself was very rewarding," he said. "I was lucky to work with someone who had been on the EarthScope project from its inception and who was more than willing to explain to me the ins and outs of seismometer installation, operation, and maintenance." Ryan enjoyed the hands-on nature of the work and being involved in every stage of installation. The internship was educational and gave him valuable real world experience beyond the classroom. He expressed his gratitude to everyone and said, "It was an amazing summer."

NAGT Intern: **Sabrina Bradshaw**
College: **University of Wisconsin -Madison**
Advisor: **Donald Wilkinson**
Location: **Kansas City, MO**
Project: **Assessment of Stream Water Quality within Kansas City Metropolitan Area**



A graduate of the University of Wisconsin-Madison with a bachelor's degree in geology and geophysics, with a certificate in environmental studies, Sabrina Bradshaw participated in the Wasatch-Uinta field camp, which gave her a nomination for the NAGT/USGS Cooperative Summer Field Training Program. For her USGS internship she worked with Donald Wilkinson at the USGS office in Kansas City, MO, where she had the opportunity to combine her field and lab experience in studying how urbanization, non-point storm runoff, and wastewater effluents impact the water quality of streams within metropolitan Kansas City and neighboring Sabrina. Her project work involved providing spatial and temporal water quality and ecological data for selected streams in the area. Sabrina sampled surface-water sites at selected streams in the Kansas City area for pharmaceuticals, pesticides, nutrients, organic wastewater compounds, trace elements, indicator bacteria, and aquatic benthic macroinvertebrates in order to characterize and assess the water quality. "These data are needed to support the development of long-term management and control strategies for non-point source pollution and combined sewer overflows," she said, "as well as to provide benchmarks against which future modifications and subsequent changes in a stream water quality and biota can be measured."

Sabrina has always looked for opportunities to gain experience in the field through classes, summer jobs, and internships. During her undergraduate career, she worked with the AmeriCorps/Student Conservation Association at Wind Cave National Park and with the Wisconsin Geological and Natural History Survey on a cooperative stream sediment data collection project with the USGS. "I'm grateful for the internship experience," she said, "which allowed me to work with USGS staff and gain invaluable experience."

NAGT Intern: **Sarah Doelger**
College: **Western Washington University**
Advisor: **Steve Schilling**
Location: **Vancouver, WA**
Project: **Mount St. Helens Assessment**

Sarah Doelger has been a geologist since she was thirteen when a visit to Hawaii sold her on the subject. "I decided then and there that lava and exploding rock were definitely for me," she said. From then on, she

was increasingly intrigued by the processes of the Earth. Sarah acquired an interest in maps, rocks, and earth history during high school, which, when it came to mountains and volcanoes, in particular, became a small obsession.

It wasn't until college, though, that she became familiar with what it actually meant to be a geologist. At Western Washington University, she had the opportunity to take a wide variety of courses and work with enthusiastic professors who introduced her to the many areas within the subject and she soon discovered that geology was much more than the identification of rocks. "While I found that I enjoyed every part of geology, my primary interest always remained with volcanoes," she said.

The highlight of her education, in her mind, was a six-week field course taught throughout the southwestern United States, which focused on structural geology, mapping methods, and the history of the Western Cordillera, and from which she was nominated for the NAGT/USGS Cooperative Summer Field Training Program. She applied for an internship with the USGS Cascades Volcano Observatory (CVO) and "crossed her fingers."

She worked primarily with geographic information systems technology to model in the lava dome of Mount St. Helens. But she also had ample opportunities to go out into the field to check cameras along the crater rim and to deploy GPS equipment at various places surrounding the volcano. She also got to participate in extended field trips to assist with geodesy projects at other Cascades volcanoes. "Perhaps the best part about CVO is the people," she said. "They are intelligent and passionate about their work. I feel included and so fortunate to be around experts who share the same excitement I have for volcanoes. She added that she wished that she had more time than just three months at CVO.

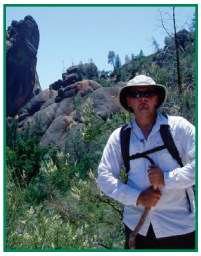
NAGT Intern: **Michael Pagel**
College: **University of Michigan, Ann Arbor**
Advisor: **Rick Wilson**
Location: **Nebraska Water Science Center**
Project: **Mount St. Helens Assessment**

A veteran of the geologic field mapping course, run by the University of Michigan in Jackson Hole, WY, Michael Pagel was nominated for the NAGT/USGS Cooperative Summer Field Training Program. He is a graduate of the University of Michigan with a bachelor's degree in geological sciences and has always had a keen interest and incessant curiosity about the physical world around him. His undergraduate studies only fueled his passion for geology and helped him to build a strong base of field experience and concurrent computer skills.

His USGS internship was with Rick Wilson in Lincoln, NE, for a project focused on water-quality monitoring project of the Missouri River in Nebraska and South Dakota. He also had the opportunity to work on projects dealing with mapping and bathymetric surveying of the Missouri River. His time back at the office was consumed by updating the long-term data record, as well as digitizing flood zones along the Platte River in central Nebraska for a cooperative project with the Federal Emergency Management Agency. "Combining all of these projects," he said, "I've had a well-rounded experience during my internship."

He praised the internship opportunity for allowing him to work with professional research scientists and gain an insightful perspective of the scientific community. He was also able to enhance his skills as a field geologist by working with, compiling, and updating geologic and hydrologic data. "I'll be attending graduate school in the near future," he said. "I feel that my internship experience has provided a solid foundation on which to begin my graduate studies. I plan to continue with field geology and look forward to an eventful career as a geoscientist."

NAGT Intern: **Michael Lyttge**
College: **California State University, Sacramento**
Advisor: **Jim Borchers**
Location: **California Water Science Center, Sacramento**
Project: **Water Quality and Hydrologic Processes a Pinnacles National Monument**



Michael Lyttge, an undergraduate student in geology at California State University-Sacramento, became fascinated with geology while attending Sierra Community College in Rocklin, CA. Always interested in the sciences, it was during an introductory geology course that he realized that there was nothing more interesting than the study of the Earth. "Geomorphology is particularly interesting to me," he said. "I love the way that the genesis of landforms can be interpreted from their physical expression. This remains one of my greatest interests in the field of geology."

Michael's USGS internship with the NAGT/USGS Cooperative Summer Field Training Program was with Jim Borchers at the USGS in Sacramento. One project he worked on was a baseline water-quality assessment of perennial springs within Pinnacles National Monument in central California. He spent a week at the park locating the springs and collecting samples, which were shipped to various laboratories for different analyses. In a second project, USGS researchers are installing two extensiometers and five wells to study land displacement processes near a pilot facility for artificial storage and recovery (ASR) in an aquifer 500-650 feet below the alluvial plain on the east side of San Francisco Bay. He explained that the ASR site, managed by the East Bay Municipal Utility District, stores excess surface water during the winter and acts as a reservoir to meet water supply needs during the summer or during extended droughts.

Michael found the internship a great experience. "Through the different projects," he said, "I've been exposed to many things and I've gained a lot working with professionals in the office as well as in the field." He said the job skills and experience acquired in the internship will make his résumé stand out against other entry level candidates. "This internship will also help me decide on future pursuits, both professional and educational," he said. "I feel very fortunate to have been a part of this program.